

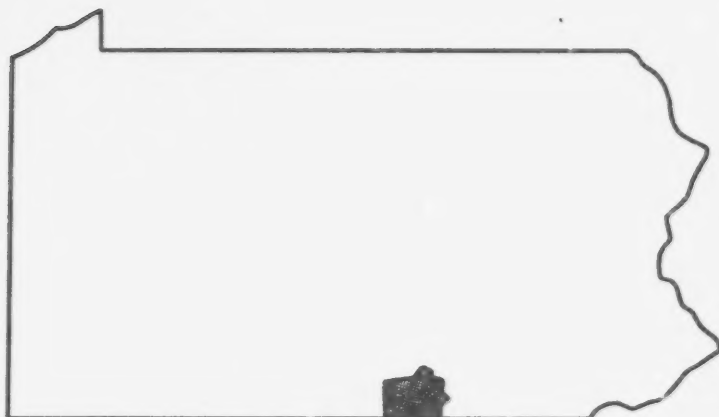
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FLOOD INSURANCE STUDY



**TOWNSHIP OF
HAMILTONBAN,
PENNSYLVANIA
ADAMS COUNTY**



JULY 4, 1988



Federal Emergency Management Agency

COMMUNITY NUMBER - 421252

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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Little Marsh Creek

Panels 03P-04P

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Flood Insurance Rate Map

Exhibit 3 - Elevation Reference Marks

FLOOD INSURANCE STUDY
TOWNSHIP OF HAMILTONBAN, ADAMS COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of Hamiltonban, Adams County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the U. S. Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 8. This work was completed in January 1987.

1.3 Coordination

On November 14, 1984, an initial Consultation and Coordination Officer's (CCO) meeting was held with representatives of FEMA, the township, and the USGS (the study contractor) to determine the streams to be studied by detailed methods. On August 26, 1987, a final CCO meeting was held with representatives of FEMA, the township, and the study contractor to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of Hamiltonban, Adams County, Pennsylvania. The Borough of

Fairfield is not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: Toms Creek, from the downstream corporate limits to a point approximately 3,470 feet upstream; and Little Marsh Creek, from the downstream corporate limits to a point approximately 4,570 feet upstream. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through January 1992.

Portions or all of the following flooding sources were studied by approximate methods: Toms Creek, Little Marsh Creek, Muddy Run, Middle Creek, Little Antietam Creek, Swamp Creek, Miney Branch, Rattling Run, Spring Run, Green Run, Carbaugh Run, Saw Mill Run, Hayes Run, Morite Creek, and Copper Run. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and the Township of Hamiltonban.

2.2 Community Description

The Township of Hamiltonban is located in the southwestern part of Adams County in south-central Pennsylvania, approximately 10 miles southwest of Gettysburg. It is bordered by the Township of Liberty and the Borough of Carroll Valley to the south; the unincorporated areas of Franklin County and the Townships of Washington, Quincy, and Guilford to the west; The Township of Franklin to the north; and the Township of Highland to the east.

2.3 Principal Flood Problems

Major floods cause localized inundation of structures along Toms Creek and Little Marsh Creek.

2.4 Flood Protection Measures

No structures exist in the community to alleviate flooding.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. A flood event of a magnitude which is expected to be equaled or exceeded once on the average during any 100-year period (recurrence interval) has been selected as having special significance for floodplain management and for flood insurance rates. This event, commonly termed the 100-year flood, has a 1 percent chance of being equaled or exceeded during any year. Although the recurrence

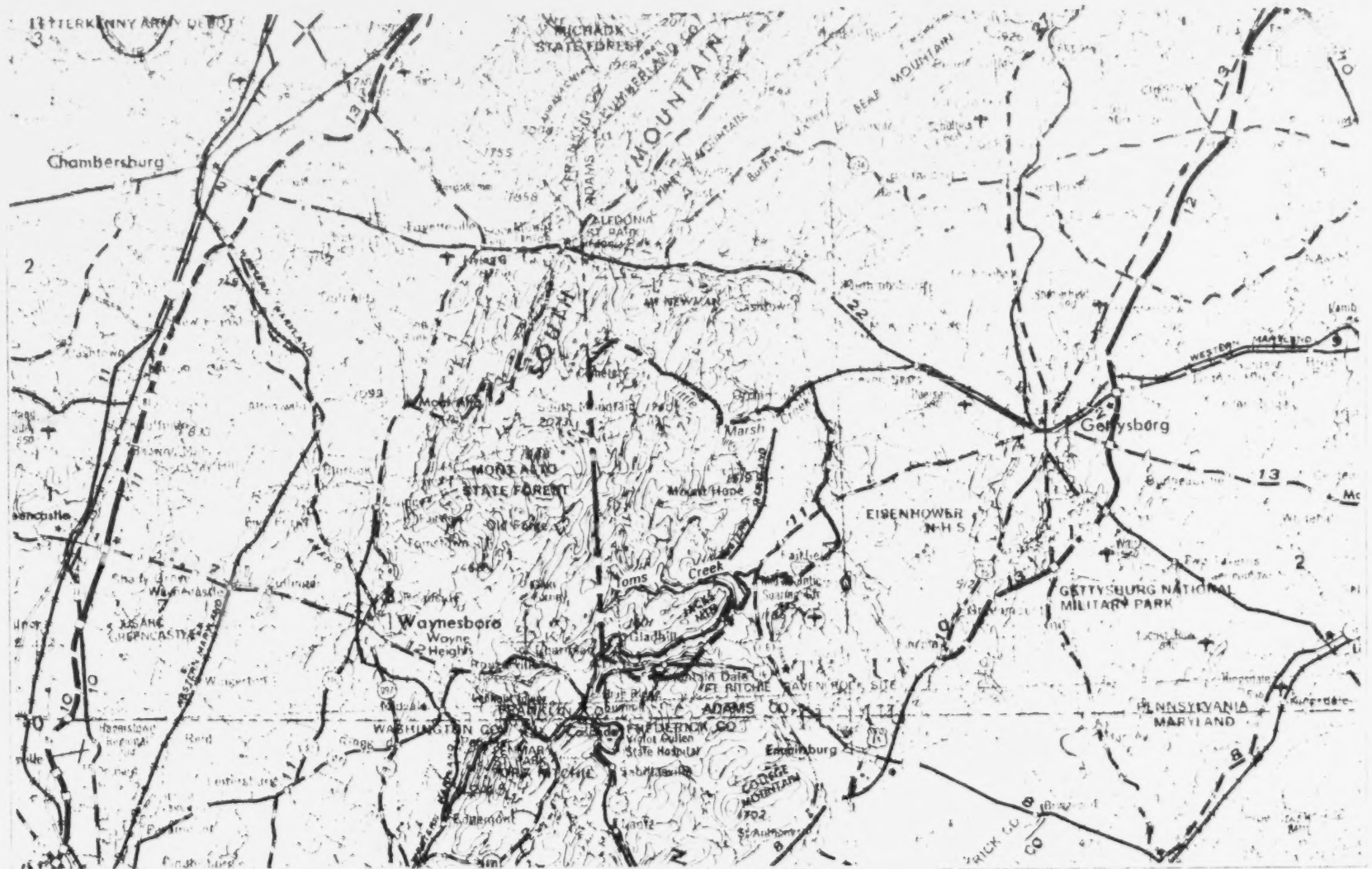


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF HAMILTONBAN, PA
(ADAMS CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

The flood-frequency discharge values for the streams studied by detailed methods were determined utilizing regional regression equations developed in USGS Water-Resources Investigations 82-21 (Reference 1).

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGE (cfs) 100-YEAR</u>
TOMS CREEK		
At Jacks Mountain Road (LR 01053) at downstream corporate limits	43.0	7,920
LITTLE MARSH CREEK		
At downstream corporate limits, at Orrtanna	5.8	1,500

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections were field surveyed and located at close intervals above and below bridges and culverts in order to compute the

significant backwater effects of these structures. All bridges, dams, and culverts in the community were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and the Flood Insurance Rate Map (Exhibit 2) where applicable.

Water-surface elevations for the detailed portion of Toms Creek were computed by modeling channel and bridge hydraulics with the USGS WSPRO step-backwater computer program (References 2 and 3).

Elevations for the 100-year recurrence interval flood for the detailed portion of Little Marsh Creek were determined from normal depths of flooding estimated from the regional relationship between drainage area and flood depth (Reference 4). This relationship was developed by means of regional regression analyses of basin areas and 100-year within-channel depths observed at stream gages. Depths were adjusted to account for increased depth due to backwater from hydraulic structures, such as bridges and culverts (References 2, 3, and 5).

Channel roughness factors (Manning's "n") used in the hydraulic computations were assigned on the basis of engineering judgment and field inspection of the floodplain areas. For the streams studied by detailed methods, the roughness coefficients for the channel range from 0.035 to 0.036, and for the overbank areas from 0.042 to 0.200.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100-year floodplain boundaries to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as

the base flood for floodplain management purposes. For the streams studied in detail, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 6).

For the streams studied by approximate methods, the boundary of the 100-year flood has been delineated using the Flood Hazard Boundary Map for the Township of Hamiltonban (Reference 7).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

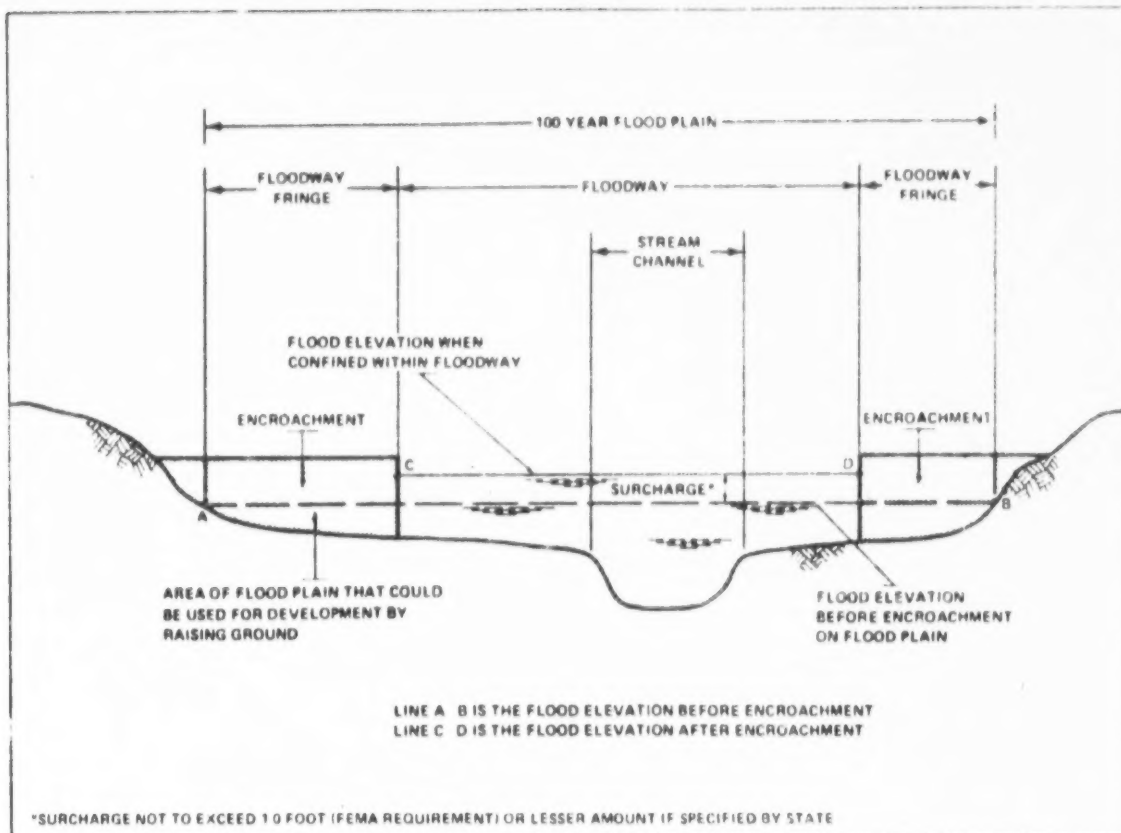
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

No floodways were calculated as part of this study.

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The zones are as follows:



FLOODWAY SCHEMATIC

Figure 2

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 10-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year floodplain. The locations of selected cross sections used in the hydraulic analyses are shown where applicable.

7.0 OTHER STUDIES

A Flood Insurance Study for the Township of Franklin has been prepared (Reference 8). The results of this study are in complete agreement with the results of that study.

Flood Insurance Studies for the Townships of Liberty, Highland, Quincy, and Guilford; and the Borough of Carroll Valley are currently being prepared (References 9, 10, 11, 12 and 13). The results of those studies will be in exact agreement with the results of this study.

Due to its more detailed nature, this study supersedes the Flood Hazard Boundary Map for the Town of Hamiltonban (References 7).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

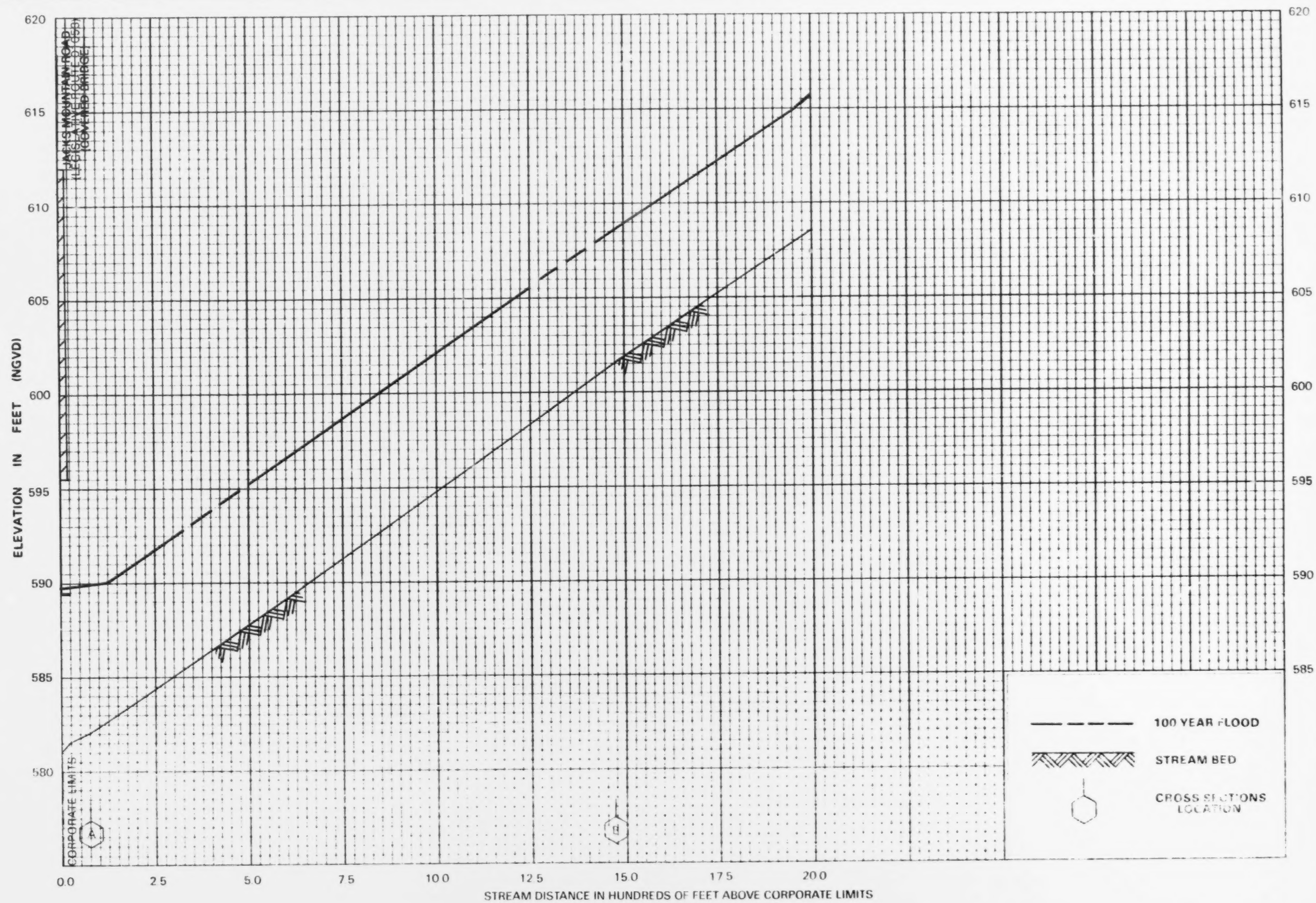
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7. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of Hamiltonban, Adams County, Pennsylvania, February 21, 1975.
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9. Federal Emergency Management Agency, Flood Insurance Study, Township of Liberty, Adams County, Pennsylvania (Unpublished).
10. Federal Emergency Management Agency, Flood Insurance Study, Township of Highland, Adams County, Pennsylvania (Unpublished).
11. Federal Emergency Management Agency, Flood Insurance Study, Township of Quincy, Franklin County, Pennsylvania (Unpublished).
12. Federal Emergency Management Agency, Flood Insurance Study, Township of Guilford, Franklin County, Pennsylvania (Unpublished).
13. Federal Emergency Management Agency, Flood Insurance Study, Borough of Carroll Valley, Adams County, Pennsylvania (Unpublished).

EXHIBIT 3 - ELEVATION REFERENCE MARKS

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 1	15	659.44	Chiseled square on north end of upstream concrete guard rail on Voo Road (T-303) bridge over Toms Creek at Iron Springs.
RM 2	05	671.87	Standard disk, stamped P 1010 1935, set in concrete post, approximately 0.5 mile southwest along CSX Transportation from Methodist Episcopal Church in Orrtanna, at crossing of Jack Road (T-315) and 36 feet south of road.



FLOOD PROFILES

TOMS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF HAMILTONBAN, PA

(ADAMS CO.)

01P

12

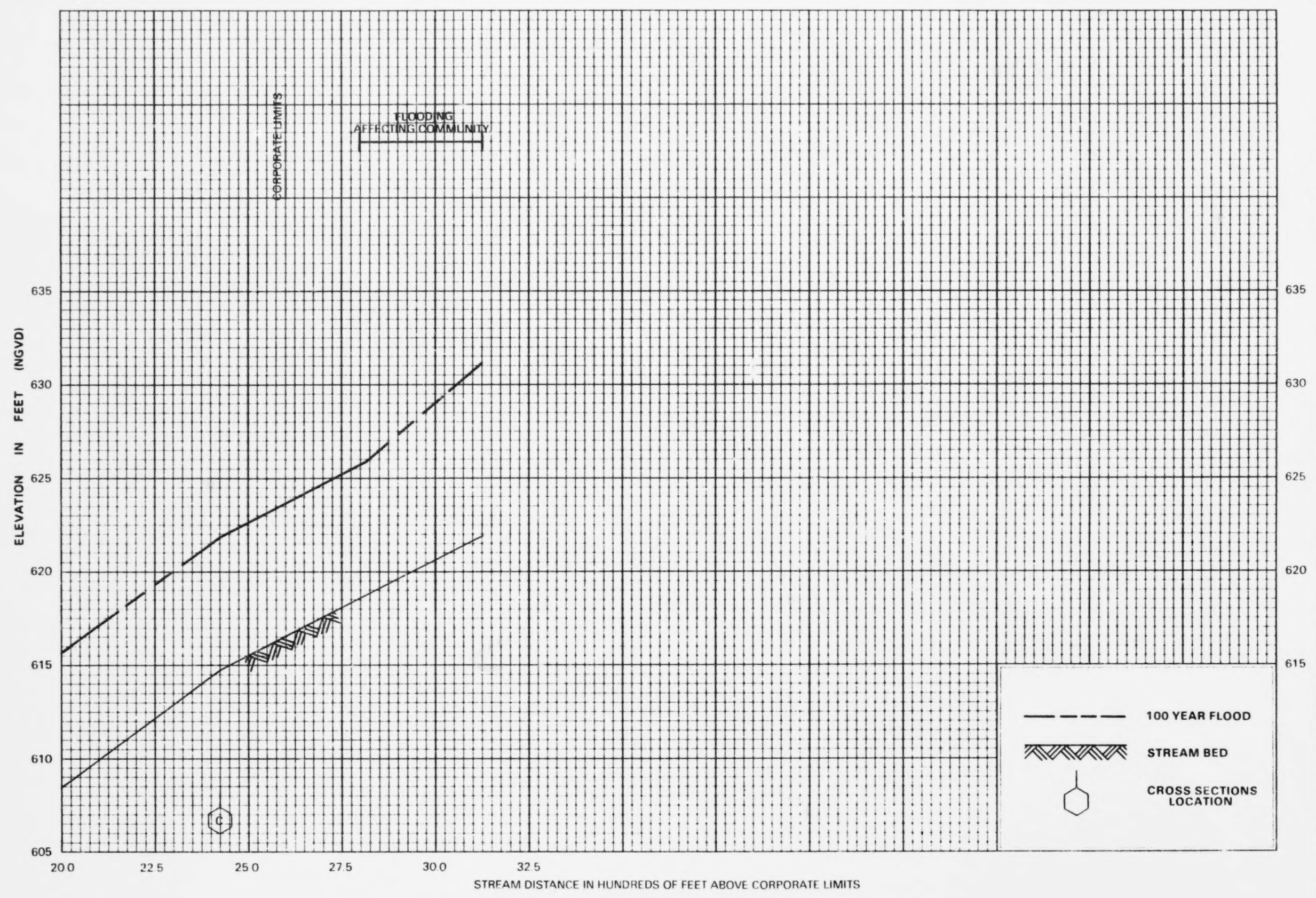
FLOOD PROFILES

TOMS CREEK

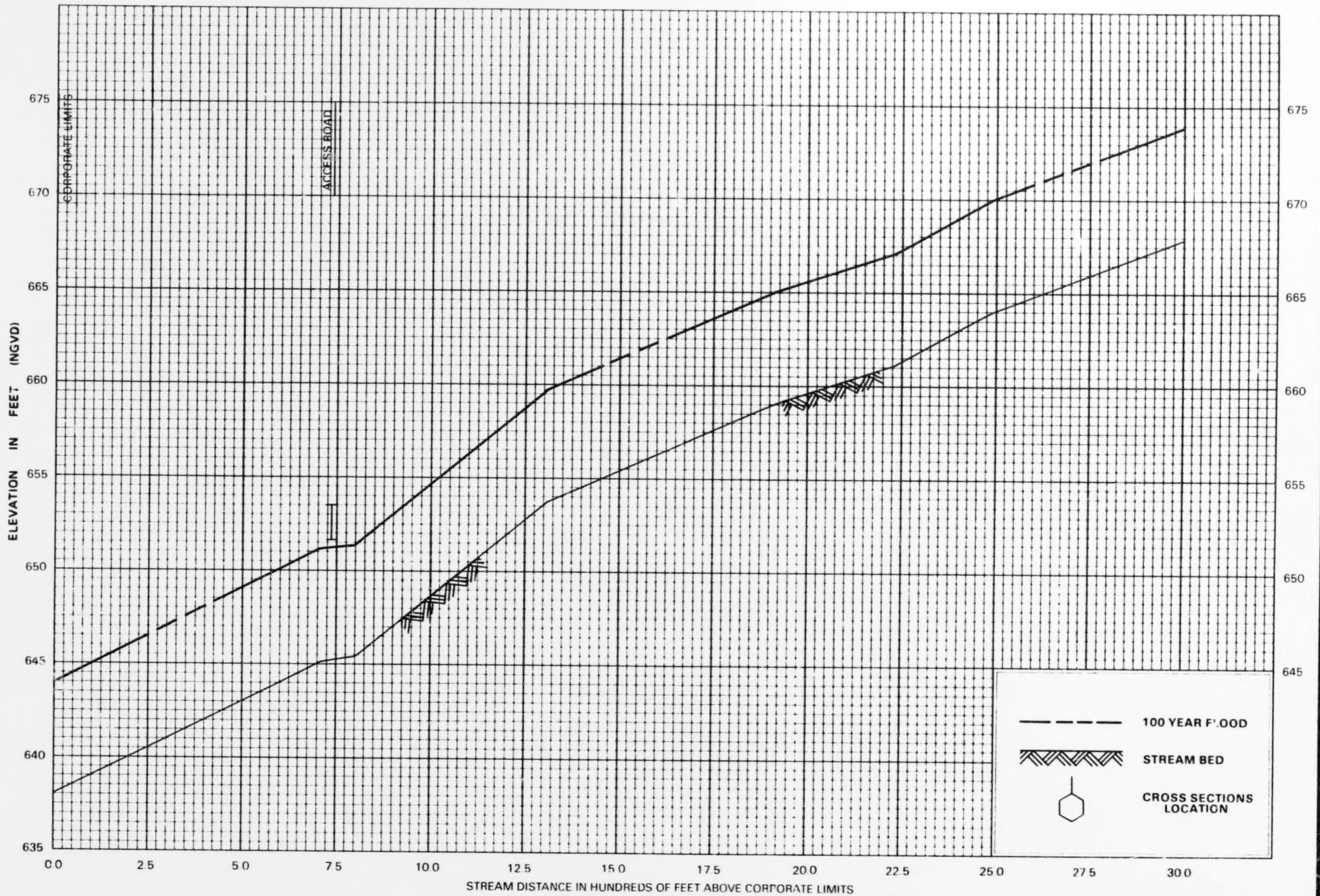
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF HAMILTONBAN, PA
(ADAMS CO.)

02P



13



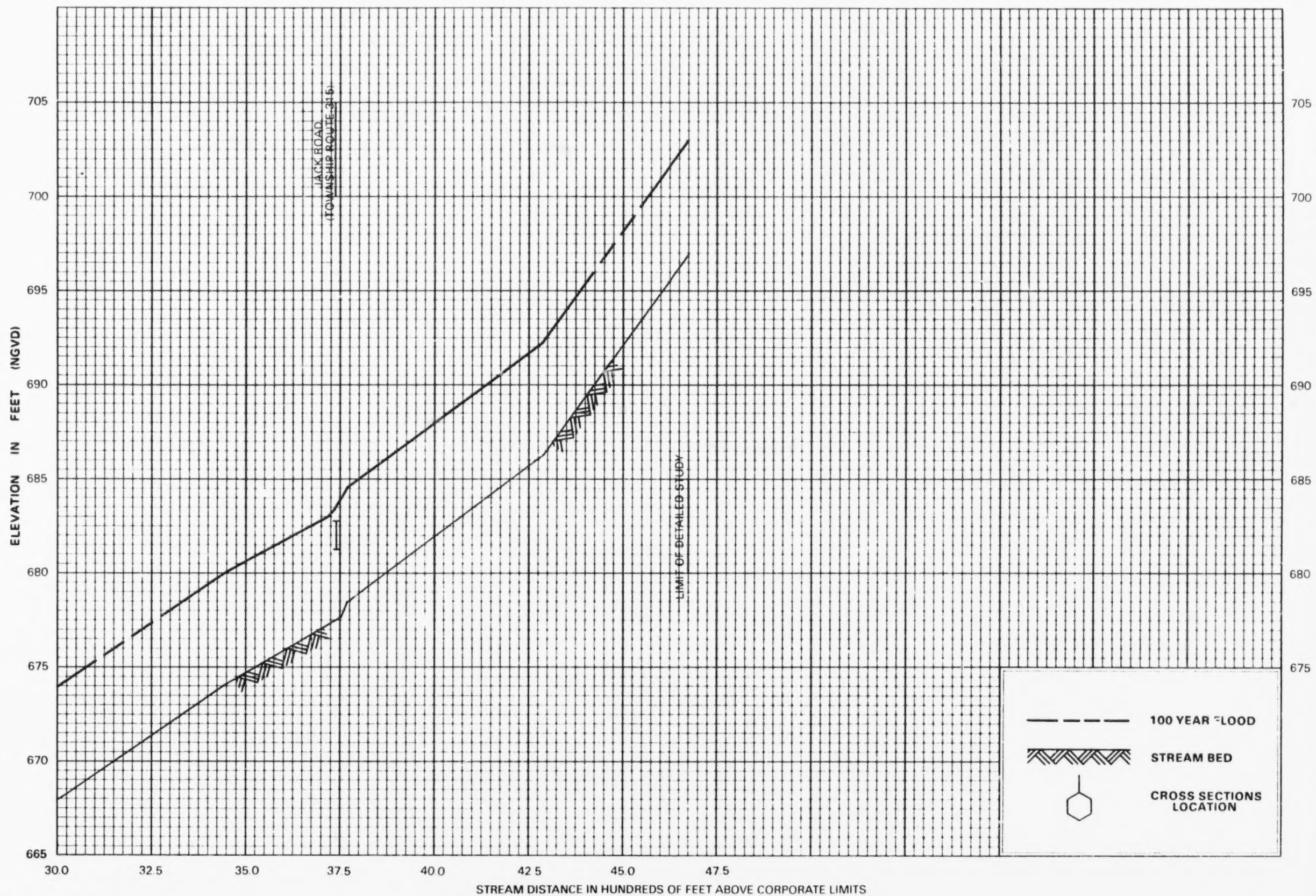
FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF HAMILTONBAN, PA
(ADAMS CO.)

FLOOD PROFILES

LITTLE MARSH CREEK

03P



FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF HAMILTONBAN, PA
(ADAMS CO.)

FLOOD PROFILES

LITTLE MARSH CREEK

04P